

A Research Bulletin

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Central District Uses Roller Compacted Concrete for Overlay

Business Issue

With current prices on conventional pavement overlays increasing, MoDOT is investigating the use of Roller Compacted Concrete to save time and money on low-volume highways in Missouri.

Background

Roller Compacted Concrete (RCC) uses less cement, less water and a higher percentage of aggregates to create a stiffer concrete mix that is compacted with vibratory rollers the same as those used in asphalt paving. According to the Portland Cement Association, "RCC is simple, fast, and economical." Most RCC projects have been limited to parking lots, industrial yards and highway shoulders, but the possibility of using RCC on local, county and state roadways is being pursued. While not yet proven on mainline paving projects, RCC has the potential of being less disruptive to traffic than conventional concrete paving. MoDOT began allowing Roller Compacted Concrete on new shoulder construction in February 2008, but a specification for mainline paving has not been finalized.

The RCC Project

Through the leadership of Central District Engineer Roger Schwartz and Glenn Robertson of Emery Sapp & Sons, RCC specialists were brought to Missouri to test this innovative overlay option. A.G. Peltz Company placed a RCC overlay on Ponderosa Road on October 29-30, 2008 with the help of local contractor Emery Sapp & Sons. The test overlay, in Boone County just south of Columbia, was placed on two, 10.5-foot lanes measuring approximately 2,000

feet in length. Unlike conventional concrete overlays, local traffic was allowed on the overlay within 24 hours of placement. While the route only has an ADT of 694, the amount of truck traffic is expected to climb with the opening of the new Gans Creek overpass. The new overpass will provide access to Route 63 for a pipeline facility located at the end of Ponderosa Road. The cost for the 6" overlay was approximately \$143,000.



Figure 1 – RCC Paver



Figure 2 – RCC Paver



Figure 3 – RCC Pavement

RCC Project (cont'd.)

To reduce project costs the Central District supplied traffic control and asphalt “wedges” for the new pavement. Despite slight delays caused by problems with the spreader, the placement was completed on time and within budget. The Central Office laboratory developed an extensive testing plan for this innovative overlay. With the stiffer, dryer concrete mix, typical sampling methods could not be used. Test cylinders were prepared using an impact hammer and test beams were cut from the end of the overlay. Nuclear Density tests were run in accordance with AASHTO T310. Cores were taken at intervals to verify compressive strength results. A concrete maturity meter was inserted into the concrete to develop an informational strength gain curve for the unconventional concrete mix. Cores were also taken to determine the density, permeability and the thermal expansion of the concrete. The ride quality of the pavement will be tested using MoDOT’s Automated Road Analyzer to determine the smoothness. MoDOT will perform all tests in-house.

RCC Findings

Initial results from the RCC placement are promising.

	Concrete Strengths (cylinders)	
	October 29 th	October 30 th
1 day	2030psi	2765psi
3 day	3500psi	3940psi
7 day	5040psi	4570psi
14 day	5240psi	5465psi

Permeability and Durability tests require 28 and 90 days, respectively, and are currently being conducted. The overlay will be evaluated again in the spring to determine how well the overlay stood up to a Missouri winter and damage created by snowplows. If successful, findings will be used to determine new RCC construction specifications, appropriate testing methods and acceptance requirements for use on mainline pavements, as well as updating the existing RCC specification for shoulders.

Technology Transfer

MoDOT received many inquiries regarding RCC from both contractors and local municipalities. On October 29, MoDOT hosted a RCC Demonstration for interested parties. More than 40 people attended the demonstration. Both contractors and MoDOT explained the technology and the testing plan for the new material. Attendees were then given the chance to ask questions and observe the construction procedure.



Figure 4 – RCC Field Demonstration